Remarks

Status of Claims

Without prejudice, Claim 28 has been amended to change "fixing the position said array" to "fixing the position of said array" as suggested by the examiner to overcome an objection to the claims under 35 USC §112.

Request for Reconsideration

In the Final Rejection, the Examiner withdrew the previous rejection, but rejected Claims 1-12, 14-32, 34, 36 and 39 based on new grounds. Specifically, the Examiner rejected Claims 1-2, 9-12, 21-31 and 39 under 35 U.S.C. §102(e) as being anticipated by Solgaard et al. (U.S. Patent Application No. 2005/0058393 A1), and rejected Claims 3-8, 14-20, 32, 34, and 36 under 35 U.S.C. §103(a) as being unpatentable over Solgaard et al. in view of Moon et al.

Without addressing specifically each rejection, the Examiner essentially stated, in one form or another, that sections 42-43 of Solgaard disclose an array of reflective elements (i.e., mirrors 46a-f), wherein the number of reflective elements exceeds the number of channels, and at least two reflective elements are used to reflect a single channel as shown in Figs 1-2 of Solgaard.

In reply, Applicants submit that the Examiner has mischaracterized Solgaard and that the claimed invention is patentably distinct over the cited prior art.

Solgaard Fails to Disclose Each and Every Element of the Claimed Invention

Solgaard fails to disclose each and every element of independent Claims 1, 28, 30, 31 and 32. It is well established in US patent law that, to anticipate a claim, each and every element of the claim must be disclosed by a single reference. Here, as recited in one form or another in each independent claim, the device comprises an array of reflective elements wherein the reflective elements exceed the number of channels and two or more reflective elements are rotated to reflect a single channel.

This is a significant feature of the claimed invention and provides for a number of important benefits, including, for example, (1) ease of assembly, (2) scalability, and (3) subchannel granularity.

The abundance of reflective elements in the device of the claimed invention facilitates manufacturing. Since the number of reflective elements exceeds the number of channels, the allocation of reflective elements to channels prior to assembly is not necessary. This obviates the need to precisely aligned specially tailored, channel-specific reflective elements in the optical device. In other words, the initial alignment of the reflective elements is not critical since there are an abundance of reflective elements which provide a relatively large target for a channel beam and thus greatly relax manufacturing tolerances. Indeed, by offering a large target, the reflective elements may be disposed in the optical device using passive alignment techniques. (Appln., Summary of Invention, p. 3, l. 24 - p.4, l. 2).

Not only does an abundance of reflective elements relax manufacturing tolerances, but also it enables the device to be readily upgradeable. That is, the reflective elements may be configured to support new rates and formats after assembly and installation of the array. (Appln., Summary of Invention, p. 3, ll. 18-24).

Finally, since two or more reflective elements are rotated to reflect a single channel, the optical device of the claimed invention provides for subchannel granularity. In other words, each reflective element reflects just a portion of a given channel, allowing that portion of the channel to be controlled independent of the channel as a whole. The principal advantage of subchannel granularity is the ability to tune portions of the channel signal. For example, individual reflective elements may be used to produce arbitrary amplitude or group delay function either within a single wavelength channel or across the supported wavelength band. This filter function can be used to reduce transmission impairment in optical transmission systems. (App-In., Summary of Invention, p. 4, ll. 8-16).

Solgaard on the other hand, does not disclose an optical device comprising an array of reflective elements in which the number of elements exceeds the number of

channels, and in which two or more elements are rotated to reflect a single channel. *To the contrary*, Solgaard discloses a device having *two* arrays of reflective elements in which each reflective element corresponds to a *single* channel. For example, with respect to Figure 2, Solgaard states that "six micromirrors 46a-46f are arranged in two arrays 48a, 48b that can be individually controlled so as to optically couple any of the three input fibers . . . ." Therefore, each micromirror of each array is used to optically couple a single beam to a single fiber. The specification goes on to describe the precise geometry of these micromirrors, debunking any notion that two or more reflective elements of an array correspond to a single channel.

It seems that the examiner may be mischaracterizing the two arrays 48a, 48b as a single array. Based on this mischaracterization, the examiner could conclude erroneously that, since one of mirrors 46a-e and one of mirrors 46d-f correspond to a single channel, two or more mirrors of the array grouping correspond to a given channel. The fact is, however, that the specification consistently refers to arrays 48a and 48b as two different arrays, thereby precluding any interpretation that mirrors 46a-f belong to a common array.

Therefore, since Solgaard is devoid of any mention that two or more reflective elements of an array can be rotated to reflect a single channel beam, it fails to anticipate the claimed invention.

There is No Motivation to Modify the Disclosure of Solgaard to Produce a Device Having and Array of Reflective Elements in Which the Elements Exceed the Number of Channels and Two or More Elements are Rotated to Reflect a Single Channel

Not only does Solgaard fail to disclose a device comprising an array having an abundance of reflective elements in which two or more reflective elements of the array are rotated to reflect a single channel, but also there is no motivation to modify the device of Solgaard in such a way. *To the contrary*, using arrays having an abundance of reflective elements would undermine the principle of operation of Solgaard. It is well established in US patent law that there can be no motivation to

modify a reference if the modification would undermine the principle of operator of the reference's teachings.

Here, the device of Solgaard uses two arrays of reflective surfaces in which each reflective surface can be individually controlled so as to optically couple any of the input fibers to the output fibers. It is critical that these arrays fall within certain size constraints. For instance, section 45 states that "the sizes of the arrays must be *small enough* such that no shadowing occurs ... ." In other words, referring to Figure 4, the array 56a must be small enough such that a beam incident on reflective element Na and reflected by array 56b must clear reflective element Nn.

Modifying the device Solgaard such that the array 48a includes an abundance of reflective elements would necessarily involve increasing the size the array. Increasing the size of the array, however, would have the deleterious effect of causing element Nn to interfere with the light reflected from array 56b--hence, the specific requirement in Solgaard that the arrays be as small as possible. Therefore, since modifying the arrays to have an abundance of elements would contravene the requirement of minimizing the size of the arrays, there can be no motivation to do so.

Additionally, when referring to the movement of the mirrors within the arrays, Solgaard indicates in section 60 that, in a preferred embodiment, the side mirrors move differently than the center mirror. That is "each of the mirrors in the switching matrix has three states, but the mirrors in the three rows do not operate identically. The central mirror may send the beam to either side, while the outer mirrors only deflect to one side."

Modifying the device of Solgaard such that two or more reflective elements are rotated to reflect a single channel would require eliminating this feature of Solgaard. Specifically, rather than having the side mirrors operate differently than the center mirror, the mirrors must be rotated identically to reflect a common channel. These are mutually exclusive functions. Since the modification would therefore require discarding a preferred embodiment of the device of Solgaard, there can be no motivation to do so.

Since there is no motivation to modify the teachings of Solgaard in accordance with the claimed invention, the rejection should be withdrawn and the claims allowed.

Allowable Subject Matter

Applicants gratefully acknowledge the Examiner's finding of allowable subject matter in Claims 13 and 37-38, but, at this time, choose to forgo amending the claims pending the Examiner's reconsideration of the application in light of the remarks above.

In light of the above remarks, an early and favorable response is earnestly requested.

Respectfully submitted,

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